

The Nelson Mandela African Institution of Science and Technology

<http://dspace.nm-aist.ac.tz>

Life sciences and Bio-engineering

Research Articles [LISBE]

2020-06-01

Spatio-temporal invasion dynamics of Maesopsis eminii in Amani Nature Forest Reserve, Tanzania

Mwendwa, Beatus A.

Elsevier B.V.

<https://doi.org/10.1016/j.foreco.2020.118102>

Downloaded from Nelson Mandela-AIST's institutional repository

Spatio-temporal invasion dynamics of *Maesopsis eminii* in Amani Nature Forest Reserve, Tanzania

Beatus A. Mwendwa, Omega E. Kaaya, Charles J. Kilawe, Anna C. Treydte

To download full text click that link

DOI: <https://doi.org/10.1016/j.foreco.2020.118102>

Abstract

Globally, invasive plant species cause negative impacts to human livelihoods and natural ecosystems, particularly in biodiversity hotspots. *Maesopsis eminii* invasion in Amani Nature Forest Reserve, Tanzania, was considered an ecological disaster in the 1980s. After >50 years have elapsed since the species was first introduced in the reserve, there is yet little information available on its invasion progress. We assessed spatio-temporal invasion dynamics using forest inventory data collected in 1998 and resurveyed 60 (20 m × 50 m) sample plots in 2018. Among resurveyed plots, 30 had been invaded by *M. eminii* in 1998 and other 30 sample plots as control, which had no *M. eminii* in the year 1998. We also assessed vegetation cover change over a 20 year period between 1998 and 2018 using Landsat satellite images. Over the last 20 years, 23% of control plots were newly invaded by *M. eminii*. Tree species richness was 25% lower in invaded versus control plots ($U = 1490$, $z = 2.9$, $p = 0.04$). Large trees ($DBH \geq 31$ –50 cm) of *Maesopsis eminii* were most abundant (62%) in invaded plots whereas small trees ($DBH \leq 10$ cm) were most abundant (>50%) in control plots, indicating that the tree species might be prone to self-thinning. Woody species diversity was significantly lower in invaded (1.63 ± 0.49) vs control plots (1.87 ± 0.35 ; $t(58) = -2.19$, $p = 0.03$). The number of *M. eminii* individuals ha⁻¹ was positively associated with higher altitudes ranging above 800 masl ($\rho = 0.33$, $P = 0.011$) but there was no correlation with distance away from the forest reserve boundary ($\rho = 0.11$, $P = 0.394$;) nor with distance away from village centers ($\rho = -0.08$, $P = 0.502$). Change detection analysis indicated about 1,108 ha of non-forest vegetation had regrown into forest over the last 20 years, particularly in the south - western region of the reserve. The region included 4 sample plots newly invaded by *M. eminii*. We conclude that there is an increase in spatial distribution of *M. eminii* individuals between the year 1998 and 2018. Furthermore, *M. eminii* has low regeneration potential in already invaded sites of high invasive density and only slowly invading gaps in uninvaded sites.

Keywords

Biodiversity hotspot; Invasive tree; Regeneration potential; Remote sensing; Distributional range; Population structure